CPSC 421: Assignment #8
Due Tuesday, October 24

Answer the questions below and turn in a hard-copy of your answers in class by the due date.

Part 1: Reading Assignment. Read the following sections in the textbook.

- Ch 8: 8.3–8.5

Part 2: Normalization. Use the relation \( R(a, b, c, d, e) \) with FDs \( a \rightarrow bc, cd \rightarrow e, b \rightarrow d, e \rightarrow a \) for questions 1–5 below.

1. What are the (minimal) candidate keys for \( R \) given the FDs?
2. Which, if any, of the FDs for \( R \) are non-key, non-trivial FDs?
3. State whether each of the following are lossless decompositions of \( R \). Justify your answer by explaining why each is either lossless or lossy.
   (a). \( R_1(a, b, c) \) and \( R_2(a, d, e) \)
   (b). \( R_1(b, c, d) \) and \( R_2(a, e) \)
   (c). \( R_1(a, b) \) and \( R_2(b, d) \)
   (d). \( R_1(a, b) \) and \( R_2(b, c, d) \)
4. Show that the decomposition of \( R \) into \( R_1(a, b, c) \) and \( R_2(a, d, e) \) is not dependency preserving.
5. Give a lossless BCNF decomposition of \( R \). Is your decomposition dependency preserving? Explain why or why not.
6. Find a lossless BCNF decomposition of your tables and FDs from HW 7. Give the original tables (with example instances), the FDs, and the new tables (with example instances). State whether your resulting design is dependency preserving.

Turn in a your answers to the above questions in class on the due date. Note that since this isn’t a programming assignment, you do not need to include a cover sheet. Be sure your answers are readable and clearly marked.